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Abstract

A sulfur scrubber structure is operable to remove substantially all of the sulfur present in an undiluted oxygenated hydrocarbon fuel stock supply for a fuel cell power plant assembly which is used to power an engine in a mobile environment, such as an automobile, bus, truck, boat, or the like, or in a stationary environment. The fuel stock can be gasoline, diesel fuel, or other like fuels which contain relatively high levels of organic sulfur compounds such as mercaptans, sulfides, disulfides, and the like. The undiluted hydrocarbon fuel supply is passed through a nickel reactant desulfurizer bed wherein essentially all of the nickel reactant in the scrubber bed reacts with sulfur in the fuel stream, whereby the nickel reactant is converted to nickel sulfide, while the desulfurized organic remnants of the fuel stream continue through the remainder of the fuel processing system. The desulfurizer bed can be formed from a highly porous ceramic or metallic foam monolith, the pores of which are coated with a nickel reactant. The foam monolith can be formed from elemental nickel per se. The use of the high surface area porous foam monolith enables essentially 100% of the nickel reactant to come into contact with the fuel stream being desulfurized.